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CHAPTER 3: REGIONAL AND INTERREGIONAL PLANNING STUDIES

3.1 Long Range Transmission Planning

The Reliability Imperative focuses on preparing the region for industry transformation as the grid evolves toward increased decarbonization goals and renewable resources. As a critical part of this effort, Transmission Evolution assesses the region’s future transmission needs and associated cost allocation holistically, including transmission to support member plans and state goals for existing and future generation resources. Long Range Transmission Planning (LRTP) is part of this effort.

The LRTP initiative is MISO’s response to the current and future resource evolution that has and continues to affect the bulk electric system. The scale and pace of these changes require prompt attention to develop the most efficient, cost-effective investments that will ensure grid reliability in the future. LRTP sets out to proactively identify key regional backbone transmission projects to support the resource change. This requires MISO to balance regional issues which should be addressed now as part of the LRTP study versus those more localized issues which should be addressed in the future through the interconnection process or in future MTEP cycles as specific load and generation locations are determined. Ultimately, the objective of the LRTP study is to identify a least-regrets transmission build-out evaluated against multiple scenarios to manage uncertainty that achieves member goals, maintains reliability, and minimizes costs.

LRTP Tranche 1 Update

On July 25, 2022, MISO approved Tranche 1 of its LRTP study, which included 18 transmission projects with a total estimated cost of $10.3B (2022$). In the first year after project approval, Transmission Owners have continued to work on more detailed engineering design and construction plans and some Transmission Owners are starting to make regulatory filings with the applicable government agencies. As project updates have been available, Transmission Owners have provided those to MISO for its project reporting, which are shared on MISO’s public website.

Additionally, as applicable, MISO has solicited proposals and selected developers for transmission projects in Tranche 1 eligible for the Competitive Transmission Process. Five Request for Proposals for Competitive Transmission Projects resulted from Tranche 1, all which MISO issued within one year of Board approval. In May 2023, MISO selected Republic Transmission to develop a competitive transmission project located in Indiana. In October 2023, MISO will select a developer for a competitive transmission project located in Missouri, and in February and April 2024, MISO will select a developer for each of the remaining three competitive transmission projects. MISO looks forward to future collaboration with Transmission Owners as the transmission projects in Tranche 1 are further designed, constructed, and placed in service.

LRTP Tranche 2 Status

Currently, MISO has moved to the next phase of the LRTP work, referred to as Tranche 2. This next Tranche will continue the work of Tranche 1 focusing on the Midwest Subregion of the MISO footprint. An important distinction from Tranche 1 is that Tranche 2 will utilize Future 2A of the recently developed Series 1A Futures to ensure transmission is available in a timely manner and meets member objectives.

In the time between the start of the Series 1 Futures (2019) and the end of the LRTP Tranche 1 effort (2022), significant changes occurred, namely acceleration of membership decarbonization and renewable
plans and State policies. This acceleration drove the need to refresh the Futures and hence the Series 1A was developed.

Tranche 2 kicked off in quarter three of 2022 with the refresh of the MISO Futures. Along the way, many LRTP Workshops have been held as well as discussions at the MISO Planning Advisory Committee (PAC) to engage stakeholders in the LRTP process. Furthering stakeholder communication efforts, MISO also developed a set of Frequently Asked Questions (FAQ) to provide a broad base of information on various LRTP topics. The first key deliverable in the LRTP Tranche 2 study was completion of the updated Future 2A expansion and siting, which is the foundation for the current work on the economic and reliability models. Additional near-term key focus areas include:

- Reliability dispatch methodology and scenarios, see Reliability Modeling Whitepaper for more detail
- Issues identification using economic and reliability models
- Portfolio development to resolve regional issues
- Continued definition and refinement of robustness scenarios to ensure identification of least-regrets solutions
- Identification of benefit metrics for Tranche 2 to demonstrate multiple distinct types of value from the portfolio

Stakeholder engagement will continue throughout the process as transmission system models are completed, analysis is performed and issues identified, necessary grid enhancement solutions are developed, scenarios are analyzed, and benefits of a proposed portfolio are quantified. Tranche 2 efforts are expected to be completed with BOD approval in 2024.

**LRTP Tranche 3 Status**

MISO’s Long Range Transmission Planning (LRTP) effort has multiple workstreams to support the different Tranches going on in parallel. Namely, MISO’s current focus is on execution of the competitive process for Tranche 1, modeling and analysis for Tranche 2, and cost allocation discussions for Tranche 3.

In the most recent FERC filing to support the bi-furcated sub-regional MVP cost allocation for Tranches 1 & 2, MISO committed to exploring an alternative cost allocation approach for Tranche 3 focused on MISO South. To effectively pursue adjustments to the methodology, MISO and its stakeholders are actively engaged in evaluating options. These conversations are centered around three main criteria:

- **Granularity** – alignment on definition and scope of granularity and how it is considered in benefit calculation and allocation methodology
- **Feasibility** - evaluation tools and techniques available to determine beneficiaries
- **Consistency** – recognition that benefits and beneficiaries may change over time and applying a cost allocation methodology that remains just and reasonable over time

Ongoing conversations can be monitored in the Regional Expansion and Criteria Working Group (RECBWG). Additionally, we appreciate the ongoing effort of OMS’ Cost Allocation Principles Committee (CapCom), Entergy Regional State Committee Working Group (ERSCWG) and other stakeholder groups in the development of a cost allocation approach for use with Tranche 3 focused on MISO South.
### 3.2 Interregional Studies

**MISO-SPP Joint Targeted Interconnection Queue (JTIQ) Study**

*Introduction and Background*

The JTIQ Study is a result of MISO and SPP’s cluster study observations which show that transmission systems at the seams are at capacity. While the addition of generation resources and transmission along the SPP-MISO seam provides benefits to the markets, current Tariff and Joint Operating Agreement (JOA) mechanisms do not provide a cost-sharing approach that can facilitate the construction of the large-scale transmission needed to interconnect expected levels of new generation near the seam. Process, criteria, and schedule differences between the respective RTOs contribute to study delays and introduce questions on study results. The JTIQ Study takes these various barriers into consideration.

JTIQ aims to provide cost and timing certainty for generator interconnection customers as affected system costs will be known at the beginning of the MISO or SPP queue studies in addition to the elimination of Affected System Studies (AFS) needed between MISO and SPP. Moreover, this concept will identify more optimized network upgrades as compared to individual AFS clusters in the current process. The full report is available [here](#).

*Study Results*

Through collaboration between the MISO and SPP Regional Transmission Organizations (RTOs), the study identified a five-transmission-project JTIQ portfolio with a planning level estimated cost of $1.06B required to address the significant transmission limitations restricting the opportunity to interconnect new generating resources near the MISO-SPP seam.

The recommended JTIQ Portfolio is expected to fully address the set of transmission constraints evaluated in the JTIQ Study as being significant barriers to the development of new generation along the MISO-SPP seam. In addition to these substantial reliability benefits, economic analysis conducted by the RTOs show customers can anticipate an Adjusted Production Cost (APC) benefit over a 10-year period of $55.7 million in the MISO footprint and $132.9 million in the SPP region. An estimated 28.7 GW of improved interregional generation enablement would be available to new generator interconnection projects near the seam.
Table 3.2.1-1: List of projects comprising the JTIQ Portfolio

<table>
<thead>
<tr>
<th>JTIQ Portfolio</th>
<th>Location by RTO</th>
<th>Cost ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bison – Hankinson – Big Stone South 345 kV</td>
<td>MISO</td>
<td>476</td>
</tr>
<tr>
<td>Brookings Co (*moved to Lyons Co.) – Lakefield 345 kV</td>
<td>MISO</td>
<td>331</td>
</tr>
<tr>
<td>Raun – S3452 345 kV</td>
<td>MISO - SPP</td>
<td>144.4</td>
</tr>
<tr>
<td>Auburn – Hoyt 345 kV</td>
<td>SPP</td>
<td>90.5</td>
</tr>
<tr>
<td>Sibley - 345 kV Bus Reconfiguration</td>
<td>SPP</td>
<td>18.8</td>
</tr>
<tr>
<td><strong>Total Cost of Portfolio of Projects</strong></td>
<td><strong>MISO - SPP</strong></td>
<td><strong>1,060.7</strong></td>
</tr>
</tbody>
</table>

**JTIQ Portfolio Update**

The original portfolio included the Brookings Co-Lakefield 345 kV JTIQ project which will be replaced by a shorter Lyons Co-Lakefield 345 kV project in the updated JTIQ portfolio due to an approved MISO MTEP 22 project, Brookings Co-Lyons Co 345 kV second circuit on existing structures. MISO and SPP are working on updating the 2023 cost estimates and APC benefit calculations based on the updated model. RTOs will share this information once the data is available.
Cost Allocation and Cost Sharing
Projects in the JTIQ Portfolio are Generator Interconnection Projects, at the 345 kV voltage level, and, accordingly, the costs will be allocated consistent with the existing cost allocation method for Generator Interconnection Projects 345 kV and above. Each generator interconnection customer included in the group and allocated costs of the JTIQ Portfolio will pay their share of capital costs based on the size of their facility in proportion to the total enabled MWs of the portfolio. Non-capital costs associated with the generator interconnection customer’s share will be allocated consistent with each RTO’s current regional Tariff. MISO and SPP will allocate the share attributable to load based on application of the Adjusted Production Cost metric and each RTO will recover those costs consistent with its regional Tariff.

Department of Energy (DOE) – Grid Resilience and Innovative Partnership Program (GRIP)
In collaboration with SPP, Minnesota Department of Commerce, Minnesota Commission, Transmission Owners and Great Plains Institute, MISO supported the application for partial funding of the JTIQ projects through the DOE Grid Innovation Program. Below is a timeline of this year’s activities.

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>JTIQ Concept Paper Submission</td>
<td>January 2023</td>
</tr>
<tr>
<td>DOE Notification to Submit Full Application</td>
<td>March 2023</td>
</tr>
<tr>
<td>Application Submitted</td>
<td>May 2023</td>
</tr>
<tr>
<td>DOE Notification of Award</td>
<td>Pending</td>
</tr>
</tbody>
</table>

Pending the DOE decision, the GRIP award could match up to 50% of the JTIQ portfolio. MISO and SPP do not anticipate this decision to impact current processes and will work with the DOE and interested parties to integrate any funding as appropriate.

Joint Operating Agreement (JOA) and Tariff updates
The MISO-SPP JOA captures changes in the planning processes, Affected System Study process, and allocation of costs between the two RTOs. MISO and SPP are collaborating with the stakeholders on updating the JOA redlines.

Summary of MISO Tariff Changes:
- Attachment X and related Appendices will be modified and potential new agreements added to incorporate the JTIQ Portfolio consistent with the MISO-SPP JOA changes
- Module A and Attachment FF are clarified and augmented to capture that the existing Generator Interconnection Project category and cost allocation applies to the JTIQ Portfolio of Generator Interconnection Projects
- New Attachments and Schedules will detail how costs will be charged to generator interconnection customers and MISO load, and how costs will be recovered and paid between the two RTOs

3.2.2 MISO-SPP Coordinated System Planning
In Q1 of 2023, MISO and SPP held an Annual Issues Review with the Interregional Planning Stakeholder Advisory Committee (IPSAC) to help determine whether to perform a Coordinated System Plan (CSP) study in 2023. After careful consideration and stakeholder discussion, MISO and SPP mutually determined not to initiate a CSP study based on the following rationale:
- No significant interregional congestion drivers were identified for consideration
• Forgoing 2023 CSP will better allow for the coordination of filing Targeted Market Efficiency Projects (TMEPs) in the MISO-SPP Joint Operating Agreement following the 2022 CSP, which involved developing the TMEP process and completing the first TMEP study with stakeholders
• No appropriate reliability constraints or public policy drivers were identified or planned at this time

3.2.3 MISO-PJM Coordinated System Planning

In Q1 of 2023, MISO and PJM held an Annual Issues Review with the Interregional Planning Stakeholder Advisory Committee (IPSAC) to help determine whether to perform a Coordinated System Plan (CSP) study in 2023. After careful consideration and stakeholder discussion, MISO and PJM mutually determined not to initiate a CSP study based on the following rationale:

• No interregional congestion drivers were identified for consideration as a part of an Interregional Market Efficiency Project study
• A Targeted Market Efficiency Project study was conducted in 2022, MISO and PJM recommended waiting another year before considering completing another study in order to have a full two years of new historical data to utilize
• No appropriate reliability constraints or public policy drivers were identified or planned at this time

3.3 Near-Term Congestion Study Update

Introduction and Background

MISO production cost analysis has traditionally focused on the medium- to long-term planning horizons with past Market Congestion Planning and Long-Range Transmission Planning initiatives. While MISO continues to prepare for the rapidly changing energy landscape of the future, some MISO stakeholders expressed interest in additional analysis focused on the near-term time horizon.

After reviewing the proposed issue in the MISO Interconnection Process Working Group and MISO Market Subcommittee, the issue was eventually assigned to the MISO Planning Advisory Committee (PAC) under PAC-2021-1: Address Congestion At Existing Resources and delegated to the Planning Subcommittee (PSC) for further stakeholder technical discussion. Additional information on stakeholder discussions and presentations on this issue can be found on the MISO website at PAC-2021-1 Address Congestion At Existing Resources.

Stakeholders proposed a similar process to the existing MISO-PJM Targeted Market Efficiency Project (TMEP) study process. TMEPs are quick-hit, low-cost interregional projects to address specific interregional market-to-market congestion issues. Notably for TMEPs, the evaluation process is limited to only a review of historical day-ahead (DA) market data rather than production cost modeling or simulation. To accommodate a more robust analysis of the MISO region (versus the limited Market-to-Market historical-only data review), MISO staff proposed a hybrid approach that would use traditional production cost modeling and simulation to evaluate issues, with a focus on the issues driving historical top congested flowgates.

MISO recreated the top identified flowgates in an available model. To better understand key drivers, additional assumption and model tweaks will be tested prior to determining final study recommendations.
**Study Objectives and Scope**

The primary objective of this study was to provide insight into recent top congestion issues seen in the MISO Day-Ahead market and identify the challenges of near-term economic modeling. MISO does not plan to recommend projects for approval based on the results of this informational study. Voluntary pursuit of any project proposals by stakeholders based on the study results should be performed in accordance with the planning processes and timelines outlined in the MISO Transmission Planning Business Practice Manual (BPM-020) and the MISO-PJM Joint Operating Agreement (MISO-PJM JOA Article IX). Cost allocation outside of market participant funding for any specific upgrades are not in scope for this effort.

Flowgates studied were determined using the following process:

- **Screening Criteria:**
  - Historical Day-Ahead market data from 2021 and 2022
  - Congestion cost, binding hours, and shadow prices
  - Data included Market to Market (M2M) flowgates, but was limited to MISO-only facilities

- Flowgates were organized by their binding element and ranked by total congestion cost

- Facilities were removed from consideration using the following criteria:
  - Project went in-service during study window which had a noticeable positive effect on congestion cost
  - Project is planned to be in-service in the near-term at the facility
  - Facility was examined extensively as part of other MISO studies (JTIQ, LRTP, TMEP, etc.) and solutions were identified

Model was developed under the following assumptions:

- We used the following Hitachi PROMOD\(^1\) releases
  - Fall 2021 gen updates and economic data
  - Spring 2022 coal prices
  - PROMOD 11.5 engine

- MTEP23 No Futures Assumptions model
  - Hartburg – Sabine was removed
  - Out of cycle projects were added if in-service date was before study window

- MTEP22 Year 2027 Summer Peak TA powerflow

- Resource utilization – generators with signed GIA additions and finalized retirement studies were included.

**Study**

**Initial Analysis**

Ten flowgates were identified for this study based on their historical congestion from 2021-2022 (see Table 3.3-1). Project testing was conducted by running the base case model, then evaluating whether historical day-ahead congestion was duplicated under the Year 5 assumptions. Only one flowgate, the Marblehead North 161/138 kV transformer, was identified as being congested in the base case model.

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\(^1\) PROMOD, Hitachi Energy owned, is a chronological security constrained unit commitment and economic dispatch tool that adheres to a wide variety of operating constraints.
<table>
<thead>
<tr>
<th>Monitored Facility</th>
<th>State</th>
<th>Owner</th>
<th>Total MISO DA Congestion Cost ($)</th>
<th>Base Economic Model Congestion Cost* (Year 2027)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marblehead North 161/138 kV Transformer</td>
<td>IL</td>
<td>Ameren</td>
<td>103,084,055</td>
<td>$283,232</td>
</tr>
<tr>
<td>Johnson Junction – Graceville 115 kV</td>
<td>MN</td>
<td>GRE</td>
<td>71,148,820</td>
<td></td>
</tr>
<tr>
<td>Cayuga 345/230 kV Transformer</td>
<td>IN</td>
<td>Duke</td>
<td>39,638,357</td>
<td></td>
</tr>
<tr>
<td>Irvine – Beacon 161 kV</td>
<td>IA</td>
<td>Alliant West</td>
<td>39,602,576</td>
<td></td>
</tr>
<tr>
<td>Jefferson County – Woody 161 kV</td>
<td>IA</td>
<td>Alliant West</td>
<td>30,763,191</td>
<td></td>
</tr>
<tr>
<td>Cayuga – Hillsdale North 230 kV</td>
<td>IN</td>
<td>Duke</td>
<td>29,928,665</td>
<td></td>
</tr>
<tr>
<td>Murphy Creek – Hayward 161 kV</td>
<td>MN</td>
<td>SMMPA/ALTW</td>
<td>28,681,570</td>
<td></td>
</tr>
<tr>
<td>Stone Lake 345/161 kV Transformer</td>
<td>WI</td>
<td>Xcel</td>
<td>28,385,411</td>
<td></td>
</tr>
<tr>
<td>Fox Lake – Rutland 161 kV</td>
<td>MN</td>
<td>SMMPA/ALTW</td>
<td>23,485,327</td>
<td></td>
</tr>
<tr>
<td>Woody – Appanoose</td>
<td>IA</td>
<td>Alliant West</td>
<td>23,098,944</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.3-1: Top 10 List of Most Congested MISO Flowgates in 2021-2022
*Annual average shadow prices x number of binding hours

Outage Analysis
Congestion at each binding facility was further reviewed to identify outage driven congestion. MISO noted congestion that may be driven by outages due to a significant number of nearby outages during similar periods of congestion. Transmission Owners of the monitored facilities in the study provided additional insight into the impacts of outages or general cause of congestion (see Table 3.3-2).

<table>
<thead>
<tr>
<th>Monitored Facility</th>
<th>MISO Identified Outage Impacts</th>
<th>Additional Information from Facility Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marblehead North 161/138 kV Transformer</td>
<td>X</td>
<td>The Johnson Junction to Graceville congestion issue was directly related to the planned construction outage on the Johnson Junction to Morris line which occurred between Oct 1, 2021 and Feb 1, 2022. The normally open line segment north of Graceville was closed in to accommodate this construction outage leading to congestion on the Johnson Junction to Graceville line. Thus, the congestion correlates the construction of the Johnson Junction-Morris construction outage and grid reconfigurations. It is understood that when upgrading transmission facilities to accommodate the changing grid, it is often necessary to alter the normal operations of the transmission system which can lead to temporary...</td>
</tr>
<tr>
<td>Johnson Junction – Graceville 115 kV</td>
<td>X</td>
<td>The Johnson Junction to Graceville congestion issue was directly related to the planned construction outage on the Johnson Junction to Morris line which occurred between Oct 1, 2021 and Feb 1, 2022. The normally open line segment north of Graceville was closed in to accommodate this construction outage leading to congestion on the Johnson Junction to Graceville line. Thus, the congestion correlates the construction of the Johnson Junction-Morris construction outage and grid reconfigurations. It is understood that when upgrading transmission facilities to accommodate the changing grid, it is often necessary to alter the normal operations of the transmission system which can lead to temporary...</td>
</tr>
</tbody>
</table>
Table 3.3-2: Outage Analysis of Study Flowgates

<table>
<thead>
<tr>
<th>Monitored Facility</th>
<th>MISO Identified Outage Impacts</th>
<th>Additional Information from Facility Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cayuga 345/230 kV Transformer</td>
<td>X</td>
<td>Congestion was likely related to Cayuga Unit 1 outage and MTEP Project 22226 is expected to relieve this congestion. (Duke)</td>
</tr>
<tr>
<td>Irvine – Beacon 161 kV</td>
<td></td>
<td>Congestion was highly correlated to several outages including MEC Diamond Trail-Hills 345 kV, MEC Montezuma-Ottumwa 345 kV, and ITC Beacon-Tri County 161 kV line upgrade outages. Ottumwa Generation outages may have also increased congestion on the line. (ITC)</td>
</tr>
<tr>
<td>Jefferson County – Woody 161 kV</td>
<td></td>
<td>Congestion was likely related to MEC Diamond Trail-Hills 345 kV line and Ottumwa Generation outages. (ITC)</td>
</tr>
<tr>
<td>Cayuga – Hillsdale North 230 kV</td>
<td>X</td>
<td>Congestion was likely related to Cayuga Unit 1 outage and MTEP Project 22226 is expected to relieve this congestion. (Duke)</td>
</tr>
<tr>
<td>Murphy Creek – Hayward 161 kV</td>
<td>X</td>
<td>Congestion was likely related to XCL Crandall-Wilmarth 345 kV line upgrade outage and ITC Adams 161 kV bus outage to connect a new generator. (ITC)</td>
</tr>
<tr>
<td>Stone Lake 345/161 kV Transformer</td>
<td></td>
<td>Facility owner confirmed minimal outage impacts. Congestion may have some relation to Manitoba Hydro flows. Congestion in 2023 has not been as extensive likely due to the refurbishment of the Eau-Claire - Arpin 345 kV line. MTEP Project 20229 is expected to further reduce binding on this line. (Xcel)</td>
</tr>
<tr>
<td>Fox Lake – Rutland 161 kV</td>
<td>X</td>
<td>Congestion was likely related to XCL Crandall-Wilmarth 345 kV and ITC-Lakefield-Dickinson County 161 kV line upgrade outages. (ITC)</td>
</tr>
<tr>
<td>Woody – Appanoose</td>
<td></td>
<td>Congestion was likely related to MEC Diamond Trail-Hills 345 kV line and Ottumwa Generation outages. (ITC)</td>
</tr>
</tbody>
</table>

Final Results

The final results for the 2023 Near-Term Congestion study, as shown in Table 3.3-3, provides the changes in Adjusted Production Costs (APC) when ratings are increased for the identified flowgates.
| Monitored Facility          | State | Owner         | APC Change ($M) *
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Irvine – Beacon 161 kV</td>
<td>IA</td>
<td>Alliant West</td>
<td>0.396</td>
</tr>
<tr>
<td>Jefferson County – Woody 161 kV</td>
<td>IA</td>
<td>Alliant West</td>
<td>-0.139</td>
</tr>
<tr>
<td>Cayuga – Hillsdale North 230 kV</td>
<td>IN</td>
<td>Duke</td>
<td>0.487</td>
</tr>
<tr>
<td>Murphy Creek – Hayward 161 kV</td>
<td>MN</td>
<td>SMMPA/ALTW</td>
<td>1.021</td>
</tr>
<tr>
<td>Stone Lake 345/161 kV Transformer</td>
<td>WI</td>
<td>Xcel</td>
<td>0.159</td>
</tr>
<tr>
<td>Fox Lake – Rutland 161 kV</td>
<td>MN</td>
<td>SMMPA/ALTW</td>
<td>0.469</td>
</tr>
<tr>
<td>Woody – Appanoose</td>
<td>IA</td>
<td>Alliant West</td>
<td>0.382</td>
</tr>
</tbody>
</table>

Table 3.3-3: Final Results of Near-Term Congestion Study

*Positive numbers represent an economic benefit and negative numbers represent an economic loss

There were three flowgates of note in the final results of this study: Marblehead North 161/138 kV Transformer, Johnson-Junction-Graceville 115 kV, and the Cayuga 345/230 kV Transformer.

- Upgrades to the Marblehead North 161/138 kV Transformer create economic losses of approximately $5 million for the system in this study. Results also show that PJM and SPP see combined economic benefits of about $3 million from the upgrade at this transformer. Additional analysis is needed to understand the results and identify opportunities for coordination with MISO interregional and JTIQ teams.
- Upgrades to the Johnson Junction-Graceville 115 kV line result in no economic changes to the system. Analysis showed this line is located between two other limiting elements on the system that are preventing increased flow on the line even with an upgrade. Additional analysis of those nearby elements is needed to assess congestion relief opportunities for this line.
- Upgrades to the Cayuga 345/230 kV Transformer result in about $2 million of economic benefits. The upgrade allowed for reduced renewable curtailment on the system. PROMOD did not identify the Cayuga 345/230 kV as a binding constraint in the base model. Additional analysis is needed to identify how the PROMOD solution did not identify congestion but did find economic benefits to upgrading the facility.

**Study Takeaways**

The MISO economic planning process is geared towards long-term planning horizons rather than near-term planning horizons. In addition to adjustments that are needed in model development to better reflect the near-term, topology changes can shift or eliminate congestion making it challenging to use historical data to identify near-term issues and solutions.

Working with stakeholders to forecast future congested flowgates outside of historical day-ahead congestion may provide additional value. Additional analysis and coordination with MISO interregional and JTIQ may also provide some insight into issues identified in the 2023 Near-Term Congestion Study.

In 2023 Q4 MISO will publish a separate Near-Term Congestion Study Report with additional insight and context on the study process.